



Research Programs

FFY 2021 AT-A-GLANCE

(October 1, 2020 - September 30, 2021)

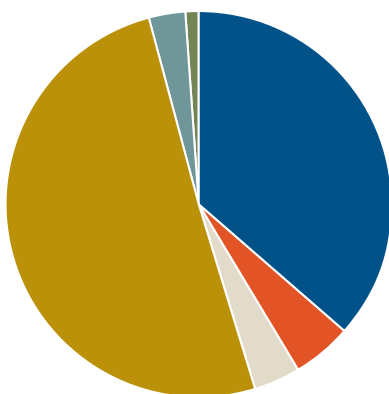
The guiding mission of the Montana Department of Transportation (MDT) is to serve the public by providing a transportation system and services that emphasize quality, safety, cost-effectiveness, economic vitality, and sensitivity to the environment.

This publication provides an overview of research, development, and technology transfer activities for federal fiscal year (FFY) 2021 within MDT's Research Programs. These activities enhance MDT's ability to meet its mission and to deliver efficient and effective transportation services.

Summary of MDT Research Programs Expenditures

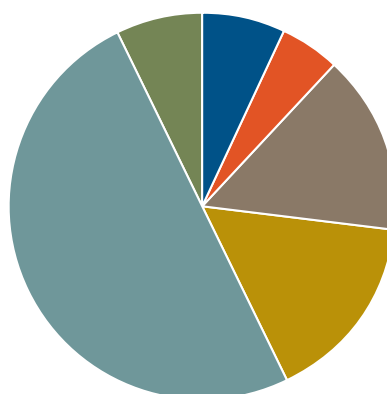
FFY 2021 Research Programs Expenditures by Funding Source

(includes pooled fund studies)



- FFY 2021 SPR-B Funds Total (80% or 100%) | 37%
- FFY 2021 SPR-A Funds Total (80% or 100%) | 5%
- FFY 2021 State Total (20%) | 4%
- FFY 2021 Other Federal Funds Total | 51%
- FFY 2021 Other State Funds Total | 3%
- FFY 2021 Consultant/Other Cost Share Total | 1%

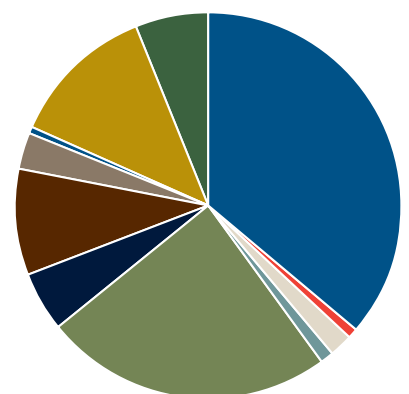
FFY 2021 Research Programs Expenditures by Project Type



- AASHTO Technical Services Program | 7%
- LTAP | 5%
- NCHRP | 15%
- Pooled Funds | 16%
- Research Projects | 50%
- TRB Core Services Support | 7%

FFY 2021 Research Project Expenditures by Subject

(includes pooled fund studies)



- Bridge/Hydraulics | 36%
- Construction | .7%
- Environmental | 2%
- Geotechnical | 1%
- Information Technology | 24%
- Maintenance | 5%
- Materials/Data Collection & Analysis | 9%
- Pavements | 3%
- Research & Innovation | .5%
- Safety | 12%
- Technology Transfer | 6%

Bridge and Hydraulics Research Projects

Project Number	Title	Consultant	MDT Project Manager	Start Date	End Date	Total Cost	FFY 2021 Expended
9696-700	Bridge Deck Cracking Evaluation	Wiss, Janney, Elstner and Associates	Callejas	8/6/19	12/31/21	\$228,000	\$31,696
9630-628	Concrete-Filled Steel Tube to Concrete Pile Cap Connections: Further Evaluation/Improvement of Analysis/Design Methodologies (Phase IV-V)	Montana State University	Callejas	7/10/18	9/30/22	\$256,000	\$27,000
9831-765	Development of Deterioration Curves for Bridge Elements in Montana	Montana State University	Callejas	8/5/19	7/15/22	\$83,000	\$34,215
9757-705	Evaluation of Thin Polymer Overlays for Bridge Decks	Wiss, Janney, Elstner and Associates	Callejas	1/22/20	3/31/23	\$83,000	\$24,718
10000-844	Exploration of UHPC Applications for Montana Bridges	Montana State University	Callejas	8/1/21	10/31/23	\$178,000	\$2,345
9925-818	Feasibility of Non-Proprietary Ultra-High Performance Concrete (UHPC) for Use in Highway Bridges in Montana: Implementation	Montana State University	Callejas	12/10/20	4/30/23	\$114,000	\$64,807
9890-784	A Feasibility Study of Road Culvert Bridge Deck Deicing Using Geothermal Energy	Montana State University	Callejas	7/13/20	12/31/23	\$235,000	\$53,033
9790-727	Monitoring Streamflow Using Video Cameras	United States Geological Survey	Callejas	8/5/19	1/31/22	\$153,600	\$57,427
9578-606	Feasibility of Non-Proprietary Ultra-High Performance Concrete (UHPC) for Use in Highway Bridges in Montana – Phase 2: Field Application	Montana State University	Callejas	3/20/18	7/31/21	\$162,000	\$19,727
9353-511	Regional Regression Equations Based on Channel-Width Characteristics to Estimate Peak-Flow Frequencies at Ungauged Sites Using Data Through Water Year 2011	United States Geological Survey	Callejas	2/1/17	5/28/21	\$240,000	\$27,000

Construction Research Projects

Project Number	Title	Consultant	MDT Project Manager	Start Date	End Date	Total Cost	FFY 2021 Expended
9929-819	Artificial Intelligence (AI) based Tool to Estimate Contract Time	Texas Transportation Institute	Callejas	8/4/21	5/31/23	\$162,897	\$0
9344-723	Effective Production Rate Estimation and Activity Sequencing Logics Using Construction Daily Work Report Data: Phase 2	Texas Transportation Institute	Sillick	6/7/19	12/31/20	\$50,000	\$8,963
9344-504 9344-723	Effective Production Rate Estimation and Activity Sequencing Logics Using Daily Work Report Data: Phases 1 and 2 Implementation	N/A	Sillick	1/1/21	TBD	\$0	N/A

Environmental Research Projects

Project Number	Title	Consultant	MDT Project Manager	Start Date	End Date	Total Cost	FFY 2021 Expended
9923-808	Effective Wildlife Fences Through Better Functioning Barriers at Access Roads and Jump-Outs	Montana State University	Callejas	12/20/20	8/31/23	\$81,000	\$32,288
9596-617	Testing Wildlife-Friendly Fencing Modifications to Manage Wildlife and Livestock Movements	University of Montana	Callejas	6/19/18	2/28/21	\$247,456	\$0
5896-423	MDT Wildlife Accommodations Process	N/A	Sillick	2/14/19	10/31/24	\$0	N/A

STATUS KEY:

Active

Completed

Implementation

Environmental Research Projects (continued)

Project Number	Title	Consultant	MDT Project Manager	Start Date	End Date	Total Cost	FFY 2021 Expended
9596-617	Testing Wildlife-Friendly Fencing Modifications to Manage Wildlife and Livestock Movements	N/A	Callejas	7/19/21	7/19/22	\$0	N/A
TBD	Evaluate MDT Electrified Wildlife Deterrent Mats	TBD	Callejas	TBD	TBD	\$442,000	N/A

Finance/Revenue Research Projects

Project Number	Title	Consultant	MDT Project Manager	Start Date	End Date	Total Cost	FFY 2021 Expended
TBD	Economic Benefits of Improving Montana's Transportation Infrastructure (EBIMTTI)	TBD	Callejas	TBD	TBD	\$83,000	N/A

Geotechnical Research Projects

Project Number	Title	Consultant	MDT Project Manager	Start Date	End Date	Total Cost	FFY 2021 Expended
9564-602	Large-Scale Laboratory Testing of Geosynthetics in Roadway Applications	Montana State University	Callejas	2/21/18	6/30/21	\$450,073	\$0
9389-522	Guidelines for Chemically Stabilizing Problematic Soils	N/A	Callejas	5/21/20	4/1/22	\$0	N/A
TBD	Development of P-Y Curves for Analysis of Laterally Loaded Piles in Montana	N/A	Callejas	TBD	TBD	\$267,000	N/A
TBD	Organization and Analysis of Measurement While Drilling (MWD) Data	N/A	Callejas	TBD	TBD	\$168,000	N/A

Information Services Research Projects

Project Number	Title	Consultant	MDT Project Manager	Start Date	End Date	Total Cost	FFY 2021 Expended
9922-807	Analyze Business Models for Implementation and Operation of a Statewide GNSS Real-Time Network	Montana State University	Callejas	2/12/20	1/31/23	\$153,510	\$54,538
9963-827	Montana LTAP Learning Management Systems	Montana State University	Sillick	7/1/2021	6/30/23	\$30,000	\$7,088

Materials/Data Collection & Analysis Research Projects

Project Number	Title	Consultant	MDT Project Manager	Start Date	End Date	Total Cost	FFY 2021 Expended
9577-607	Alkali-Silica Reactivity in the State of Montana	Montana State University	Callejas	4/6/18	11/30/21	\$109,000	\$15,566
9921-806	Numerical Modeling of the Test Pit for Falling Weight Deflectometer Calibration	Montana State University	Sillick	11/19/20	2/28/22	\$36,641	\$21,542
TBD	Aging Conditions for Hot Mix Asphalt Cracking Test	N/A	Callejas	TBD	TBD	\$75,000	N/A

STATUS KEY: Active Completed Implementation Proposed

Safety Research Projects

Project Number		Title	Consultant	MDT Project Manager	Start Date	End Date	Total Cost	FFY 2021 Expended
9679-699		Developing a Methodology for Implementing Safety Improvements on Low-Volume Roads in Montana	Montana State University	Callejas	2/15/19	11/30/21	\$134,887	\$291
9832-766		Effectiveness of Highway Safety Public Education at Montana Motor Vehicle Registration Stations by Streaming a Variety of Safety Content	Montana State University	Callejas	3/15/20	10/31/22	\$240,656	\$92,083
9891-785		Icy Road Forecast and Alert (IcyRoad): Validation and Refinement Using MDT RWIS Data	University of Montana	Callejas	7/13/20	3/31/22	\$84,000	\$57,355
8882-309		Traffic Safety Culture Transportation Pooled Fund (TSC-TPF) Program – Phase 1	Montana State University	Sillick	10/1/14	9/30/22	\$1,194,000	\$161,408
POOLED FUND 8882-309 SUBPROJECTS	8882-309-15	Guidance on Messaging to Avoid Reactance and Address Moral Disengagement	Montana State University	Sillick	2/2019	7/2021	\$149,378	\$31,515
	8882-309-16	Guidance to Promote Workplace Policies and Family Rules to Reduce Cell Phone Use While Driving and Promote Engaged Driving	Montana State University	Sillick	7/2019	9/2021	\$167,968	\$122,084
	8882-309-14	Guidance for Evaluating Traffic Safety Culture Strategies	Montana State University	Sillick	2/2019	3/2021	\$62,426	\$7,809
8882-444		Traffic Safety Culture Transportation Pooled Fund (TSC-TPF) Program – Phase 2	Montana State University	Sillick	10/1/19	9/30/24	\$1,440,000	\$77,530
POOLED FUND 8882-444 SUBPROJECTS	8882-444-18	FFY 2021 Management Support Contract	Montana State University	Sillick	10/2019	9/2024	\$20,644	\$24,941
	8882-444-19	A Review of Methods to Change Beliefs	Montana State University	Sillick	3/2021	5/2022	\$86,425	\$32,057
	8882-444-20	Resources and Tools to Reduce Multi-Risk Driving Behaviors	Montana State University	Sillick	3/2021	3/2024	\$234,887	\$20,532
9932-820		Safety Evaluation of Sinusoidal Centerline Rumble Strips	TBD	Callejas	TBD	TBD	\$222,000	\$0
TBD		Use of Fluorescent Orange Delineators in Temporary Traffic Control Work Zones	Montana State University	Callejas	TBD	TBD	\$100,000	N/A

Annual Programs

Project Number	Title	MDT Contact	Start Date	End Date	FFY 2021 Cost
AASHTO TECHNICAL SERVICES PROGRAM					
7831	AASHTO Technical Services Program	Sillick	10/1/20	9/30/21	\$112,737
ADMINISTRATION					
8010	Administration and Conduct of Research	Sillick	10/1/20	9/30/21	\$367,170
8020	Administration and Conduct of Research	Sillick	10/1/20	9/30/21	\$29,564
8021	Administration and Conduct of Research	Sillick	10/1/20	9/30/21	\$49,397
9529-589	MDT Consultant Project Management	Sillick	7/1/20	6/30/21	\$171,791
LOCAL TECHNICAL ASSISTANCE PROGRAM					
2443-038	Montana Local Technical Assistance Program (LTAP)	Sillick	7/1/20	6/30/21	\$380,000

STATUS KEY: Active Completed Proposed

Annual Programs (continued)

Project Number	Title	MDT Contact	Start Date	End Date	FFY 2021 Cost
TRANSPORTATION RESEARCH BOARD SUPPORT					
TPF-5(473)	TRB Core Services	Sillick	10/1/20	9/30/21	\$109,301
TPF-5(421)	NCHRP	Sillick	10/1/20	9/30/21	\$489,687

Experimental Projects

All Experimental Projects are managed by Chad DeAustin.

Pending Experimental Projects have not yet been constructed. Proposed Experimental Projects do not yet have a project assigned.

Project Number	Experimental Project Number	Title	Project Type	Construction Year	End Date
IM 15-5(124)282	MT-17-05	3/8" Asphalt Cement Mix Placement With No Chip Seal Evaluation	Asphalt Concrete Pavement Evaluation	2017	2022
STPP 87-1(11)0	MT-15-02	3D Synthetic Geocomposite for Added Subsurface Drainage Layer in Asphalt Cement Pavement Structure Evaluation	Geocomposite Application	2016	2022
N/A	MT-17-04	Centerline Rumble Strip Evaluation	Centerline Rumble Strip	2017	2023
IM 15-6(43)323 STPS 218-1(11)0	MT-20-04	Crafco Mastic One Joint Filler Evaluation	Crack Seal and Pavement Repair	2020	2025
STPP 6-1(156)99 STPP 6-1(154)109	MT-19-02	CRS-2P and CHFRS-2P Emulsion Comparison on Chip Seal	Chip Seal (CS) Performance	2019	2024
NHIP-NHPBP 8-4(66)86 STPP 6-1(126)57	MT-20-01	Electric Wildlife Deterrent Mat	Wildlife Crossing Structure	2020-2021	TBD
NH 12-1(20)0 UPN 8762000	MT-15-01	Fog Seal Chip Retention Evaluation	Fog Seal on Chip Seal	2017	2022
IM 90-1(220)6	MT-18-01	Fog Seal Over Chip Seal Evaluation	Fog Seal on Chip Seal	2017	2022
NH 1-6(123)355	MT-20-02	High Float vs. Polymer Modified Emulsion Seal and Cover With and Without a Fog Seal	Fog Seal/Chip Seal Emulsion Comparison	2020	2025
STPP 86-1(55)10	MT-19-05	JOINTBOND Asphalt Joint Stabilizer	Centerline Joint Stabilizer Treatment	2019	2025
STPP 83-1(40)32	MT-20-06	Longitudinal Centerline Asphalt Cement Joint Membrane	Void Reducing Asphalt Membrane (VRAM)	2020	2025
STPP 86-1(27)0	MT-21-06	Nomaflex Concrete Joint Filler Evaluation	Concrete Expansion Joint	2021	TBD
UPPIP 1017(2)7 UPPIP 1029(4)	MT-18-03	Reinforcing Fibers in Plant Mix Asphalt Cement Evaluation	Sasobit-Aramid Fiber Reinforced Asphalt Cement	2018	2023
NH 8-4(79)68	MT-21-02	Road Smoothing	Road Smoothing	2021	2026
UPN 9370	MT-18-02	Sinusoidal Centerline Rumble Strip Evaluation	Centerline Sinusoidal Rumble Strip	2018	2023
STPP 20-2(31)62	MT-20-05	SKAPS GT116N Nonwoven Textile Bond Breaker	Nonwoven Textile Bond Breaker CTB/PCCP	2020	2025
IM 90-1(205)59	MT-13-14	Sprayroq-SprayWall Polyurethane Applied Culvert Rehabilitation Evaluation	Culvert Rehabilitation	2017	2022
IM 94-6(59)193	MT-21-04	Surfacing In-Slope Treatment Evaluation	Topsoil Surfacing Comparison	2021	2026

STATUS KEY: Active Completed

Experimental Projects (continued)

Project Number	Experimental Project Number	Title	Project Type	Construction Year	End Date
STPP 17-1(10)11	MT-18-05	T15 Base One Soil Stabilization Evaluation	Full-Reclamation Chemical Soil Stabilization	2018	2025
8978000 UPP 5201(24)	MT-17-03	TenCate Mirafi MPV400 Polypropylene Nonwoven Geotextile Evaluation	Milled Overlay With Paving Fabric	2017	2022
IM 90-1(215)0	N/A	Seal Coat Asphalt Emulsion (or Fog Seal Coating) Over Chip Seal for Improved Chip Retention Evaluation	Resurfacing – Seal and Cover	2015	2021
HSIP-NH 1-2(193)118	MT-21-05	Polymer Overlay on PCCP	Polymer Overlay on PCCP	2021/2022	TBD
STPS 313-1(17)1	MT-21-03	TENAX LBO 220 Geogrid	Geogrid Fabric for Geotech Stabilization	2021/2022	TBD
N/A	N/A	Animal Detection System: Zapcrete System	N/A	N/A	N/A
N/A	N/A	Diamond Road Smoother	N/A	N/A	N/A
N/A	N/A	High Friction Surface Treatment	N/A	N/A	N/A
N/A	N/A	Prefabricated Steel Truss/Bridge Deck System Evaluation	N/A	N/A	N/A
N/A	N/A	Roundabout Striping Durability Trials Evaluation	N/A	N/A	N/A
N/A	N/A	Texas Underseal With Added Scrub Seal Evaluation	N/A	N/A	N/A
N/A	N/A	Weather-Activated Detection System Evaluation	N/A	N/A	N/A
N/A	N/A	Yellow-Dyed Concrete Curbing to Replace Epoxy-Applied Curbing Evaluation	N/A	N/A	N/A

Transportation Pooled Fund Studies

Project Number	Title	MDT TAC Member	Lead Agency	# of Partners	Start Date	End Date	Total MDT Commitment	FFY 2021 Expended
TPF-5(349)	Western Alliance for Quality Transportation Construction (WAQTC)	Metcalf	UT DOT	11	6/27/17	12/31/21	\$108,000	\$12,000
TPF-5(353)	Clear Roads Phase II	McBroom	MN DOT	36	1/1/17	12/30/21	\$125,000	\$25,000
TPF-5(376)	Northwest Passage Phase #4	Warren	MN DOT	6	2018	2022	\$125,000	\$25,000
TPF-5(391)	Comprehensive Field Load Test and Geotechnical Investigation Program for Development of LRFD Recommendations of Driven Piles on Intermediate GeoMaterials	Helm	WY DOT	7	2/19/19	12/31/23	\$45,000	\$15,000
TPF-5(394)	Western Maintenance Partnership – Phase 3	McBroom	UT DOT	6	1/2019	6/2024	\$15,000	\$5,000
TPF-5(399)	Improve Pavement Surface Distress and Transverse Profile Data Collection and Analysis, Phase II	Padmos	FHWA	24	4/2019	9/2025	\$75,000	\$15,000
TPF-5(437)	Technology Transfer Concrete Consortium (FY20-FY24)	Needham	IA DOT	34	1/1/20	12/31/25	\$48,000	\$12,000
TPF-5(447)	Traffic Control Device (TCD) Consortium (3)	Brelin	FHWA	30	2/12/20	2/12/25	\$30,000	\$10,000
TPF-5(454)	Updating U.S. Precipitation Frequency Estimates for the Northwest	Hedstrom	FHWA	2	6/3/20	12/31/23	\$400,560	\$133,520

STATUS KEY:

Active

Completed

Pending

Proposed

AASHTO Technical Services Programs

Title	MDT Project Champion	MDT Funding Level
AASHTO Equipment Management Technical Services Program (EMTSP)	Kerttula	\$5,483
AASHTO Innovation Initiative (All) Technical Services Program	Sillick	\$6,580
AASHTO Load and Resistance Factor Design (LRFD) Bridges and Structures Specification Maintenance (LRFDSM) Technical Services Program	Brandenberger	\$16,449
AASHTO National Transportation Product Evaluation Program (NTPEP) Technical Services Program, includes AASHTO Product Evaluation List (APEL)	Metcalfe	\$21,932
AASHTO re:source (formerly AASHTO Materials Reference Library (AMRL) Technical Services Program)	Metcalfe	\$29,395
AASHTO Technical Service Program to Develop AASHTO Materials Standards (DAMS)	Metcalfe	\$10,966
AASHTO Transportation System Preservation Technical Services Program (TSP2)	Padmos	\$21,932
AASHTOWare Project Data Analytics	Durbin	\$276,750

MDT Library

The MDT Library and technology transfer functions, managed by Bobbi deMontigny, are located within the Department's Research Programs to capture and make accessible transportation-related information, particularly that which relates to the needs of MDT staff.

Library Collection Analysis by Item Type

Item Type	Number of Items
Book	20,041
CD	352
Digital	11,901
DVD	249
Journal	1,121
Kit	20
Map	5
Media Equipment	10
Microform	2
OverDrive	414
Pamphlet	9
TOTAL	34,124

Library Circulation by Item Type

Item Type	Total Circulation
Book	228
CD	2
Interlibrary Loan Borrowed	11
Interlibrary Loan Lent	5
Media Equipment	0
OverDrive Audio & E-Books	224
TOTAL	470

Digital resources are not included in the circulation statistics. Please see the last page for the number of users accessing the library digitally.

STATUS KEY: Active



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MDT

To view the MDT Research Programs Annual Reports, please visit the MDT website at www.mdt.mt.gov/research/annual_report.shtml.

RESEARCH PROJECTS

25

Active
research
contracts

7

Research
reports

10

Number of
new research
projects in
2021

9

MDT-supported
pooled fund
studies

81

Active
Technical Panel
members

EXPERIMENTAL PROJECTS

20

Active
experimental
projects

2

Number
of new
experimental
projects in
2021

LIBRARY

753

Unique library
catalog visitors

1,046

Unique library
catalog visits

1,675

Unique library
catalog searches

CONTACT US

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